Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Study of atmospheric pressure discharges with a novel hybrid code DENIS EREMIN, TORBEN HEMKE, RALF-PETER BRINKMANN, THOMAS MUSSENBROCK, Ruhr-Universität Bochum — Numerical simulations bear special significance in helping to understand the phenomena taking place in the atmospheric discharges as the diagnostic capabilities are severely limited there due to small sizes of such discharges. In this work we study atmospheric pressure discharges with a fully self-consistent hybrid code, where the kinetically treated electron component is calculated on GPU using the PIC/MCC approach and ions are treated under the fluid approximation on CPU. The resulting code is fast, because the computationally intensive kinetic algorithm is parallelized on GPU, flexible, because it is straightforward to include complex chemistry processes for the ion component in the fluid model, and allows to capture all the essential physics due to quite general assumptions underlying the model. A comparison with fully fluid simulations is made. We demonstrate with our code that the kinetic description of electrons is important even for the atmospheric pressure discharges.

Denis Eremin
Ruhr-Universität Bochum

Date submitted: 18 Jun 2012 Electronic form version 1.4